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ABSTRACT

High school social studies students (n=448) were each assigned to one of 16 groups defined by possible combinations of two teacher uncertainty conditions (uncertainty vs. no uncertainty), two teacher "bluffing" conditions (bluffing vs. no bluffing), two lesson discontinuity conditions (discontinuity vs. no discontinuity), and two lecture notes conditions (notes handouts vs. no notes handouts). Each group was presented a lesson about the geography, politics, history, and economy of the country of Botswana. The lessons were the same except for variations in the four conditions stated above. After the lesson, each group was tested on comprehension of the material, and then each group completed a lesson evaluation. Teacher uncertainty negatively affected achievement, and notes handouts positively affected achievement. Both teacher bluffing and lesson discontinuity negatively affected student evaluation of the lesson. Several significant interactions were obtained. These findings are discussed in relation to previous research on low-inference behaviors related to teacher clarity. (Author)

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Presentational Behaviors and Student Performance

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Presentational Behaviors

Abstract

High school social studies students (n = 448) were each assigned to one of 16 groups defined by possible combinations of two teacher uncertainty conditions (uncertainty vs. no uncertainty), two teacher "bluffing" conditions (bluffing vs. no bluffing), two lesson discontinuity conditions (discontinuity vs. no discontinuity), and two lecture notes conditions (notes handouts vs. no notes handouts). Each group was presented a lesson about the geography, politics, history, and economy of the country of Botswana. The lessons were the same except for variations in the four conditions stated above. After the lesson, each group was tested on comprehension of the material, and then each group completed a lesson evaluation. Teacher uncertainty negatively affected achievement, and notes handouts positively affected achievement. Both teacher bluffing and lesson discontinuity negatively affected student evaluation of the lesson. Several significant interactions were obtained. These findings are discussed in relation to previous research on low-inference behaviors related to teacher clarity.

Presentational Behaviors and Student Performance

According to Rosenshine and Furst (24,25), teacher clarity is the most consistent link between a teacher behavior (process) and student achievement (product). Bush, Kennedy, and Cruickshank (5), Dunkin and Biddle (9), and Rosenshine (23), recommended that teacher clarity be studied further. Much research on teacher clarity has been descriptive or correlational (23) and has studied high-inference teacher behaviors. Land and Smith (19) differentiated between high-inference teacher clarity variables (which are open to subjectivity) and low-inference teacher clarity variables (which can be observed and objectively quantified). One low-inference teacher clarity variable studied by Land and Smith is referred to as vagueness terms.

Vagueness Terms

Descriptive research by Hiller, Fisher and Kaess (13), Smith (26), Dunkin (8), and Dunkin and Doenau (10) reported negative correlations between teacher use of vagueness terms and student achievement. Hiller (12) found evidence that vagueness occurs as a teacher tries to present material he or she can't remember or never fully understood. Hiller et al. (13) defined vagueness to be "a psychological construct which refers to the state of mind of a performer who does not sufficiently command the facts or the understanding required for maximally effective communication" (p. 670). Vagueness terms were defined (13) according to the following nine categories (examples are included in parentheses): (1) ambiguous designation (somehow, other, thing), (2) approximation (about, mostly,

sort of), (3) "bluffing" and recovery (actually, anyway, basically, obviously, of course, so to speak, you know), (4) error admission (excuse me, I'm sorry, I guess), (5) indeterminate quantification (a few, a lot, several), (6) multiplicity (aspects, sorts, kinds), (7) negated intensifiers (not all, not many, not very), (8) possibility (may, might, perhaps), and (9) probability (frequently, ordinarily, sometimes). Smith and Land (31) reviewed 13 studies of teacher use of vagueness terms. In 12 of the studies vagueness terms produced a significant negative effect on student achievement. In the one study in which use of vagueness terms did not significantly affect achievement, students nevertheless rated lessons that contained high frequencies of vagueness terms as being poorly organized and as lacking in clarity. In all the studies reviewed (31), frequencies of vagueness terms were reported as totals across all nine categories of terms, rather than as subtotals to indicate occurrences in each of the distinct nine groups. For example, Smith and Cotten (28) reported research in which 46 per cent of the vagueness terms used in the lessons they studied were from the "bluffing" and recovery category, yet the nine categories of vagueness terms were examined as a single variable. Hiller et al. (13) stated that, because of the large number of vagueness terms they identified (more than 200), it was difficult to test individual vagueness categories for significance. In an attempt to identify vagueness categories that produce the greatest effects on achievement, the present study investigated the "bluffing" and recovery category separate from the six categories of ambiguous designation, approximation indeterminate quantification, multiplicity, possibility, and probability. These six categories are referred to in the present study as "teacher uncertainty".

Strunk and White (32) noted that these phrases of uncertainty sound ambiguous and irresolute and referred to such statements as "the leeches that infest the pond of prose, sucking the blood of words" (p. 73).

The rationale for investigating the "bluffing" and recovery category of vagueness terms separately from the six categories representing "uncertainty" is that "bluffing" and recovery terms are more representative of superfluous or "filler" phrases (e.g., in essence, to tell the truth, you know), phrases of "dismissal of detail" (e.g., and so on, anyway, to make a long story short) and as phrases of opinion (e.g., clearly, obviously, as you surely know) than they are an overt display of uncertainty. Such phrases do not add to the substantive content of the lesson. Strunk and White (32) advised that effective communication is concise, containing no superfluous phrases, and that shortcuts should not be taken at the cost of clarity. They suggested that opinions "may not be relevant to the discussion. Opinions scattered indiscriminately about leave the mark of egotism" (p. 80).

The vagueness categories of error admission and negated intensifiers were not examined in the present research.

Discontinuity

Another low-inference variable related to teacher clarity is discontinuity. Kounin (15), Kounin and Doyle (16), and Kounin and Gump (17,18) examined discontinuity within the classroom as it relates to use of time and on-task pupil behavior. These studies indicated that disruptive teacher transitions in moving from one activity to another negatively influence time flow and pupil behavior in the classroom. Arlin (2) provided

further support to this contention. However, these studies focused on teacher moves from one lesson to another rather than on transitions within a lesson. Smith (26) indicated that a lesson in which objectives were dealt with step by step rather than in a discontinuous fashion was likely to induce more student achievement. Kennedy, Cruickshank, Bush, and Myers (14) added further evidence that within a lesson, smooth transitions from one point to the next enhanced teacher clarity, whereas discontinuity, as evidenced by digressions or irrelevant interjections of subject matter, negatively influenced clarity. Smith and Cotten (28) investigated two forms of lesson discontinuity. One form was the introduction of irrelevant teacher remarks into the lesson. The second form was the interjection of relevant information at inappropriate times in the lesson. These forms of discontinuity produced a significant negative effect on achievement. The present study investigated discontinuity as it was defined by Smith and Cotten.

Lecture Notes Handouts

Smith (27) reported attempts to train teachers to teach clearly. He suggested that handouts of lecture notes may reduce the negative effects of teacher clarity inhibitors such as use of vagueness terms and lesson discontinuity. Collingwood and Hughes (6) found that students achieve more when they are given lecture notes handouts. Annis (1) indicated that a partial outline of the lecture with only the major points included was a more effective handout format than other forms of handout, such as a full copy of the lecturer's notes or students's personal notes. In the present study, the use of lecture notes handouts in which the major points were supplied was investigated.

Student Perception

Those who question the value of student evaluations of instruction suggest that the student lacks the experience and the perspective to assess instructional effectiveness. But research by Frey (11), Marsh, Fleiner, and Thomas (20), Braskamp, Caulley, and Costin (4), and Marsh and Overall (21) revealed that when instructors of the same course gave a common final examination, the classes that rated their instructors high (low) made high (low) examination scores. Smith and Land (30) reported that student perception of lesson effectiveness was low (high) when the teacher used a high (low) frequency of vagueness terms. Smith and Cotten (28) reported similar results concerning vagueness terms and student perception, and also found that lesson discontinuity caused students to rate the teacher low in terms of staying on the main subject of the lesson. Murray (22) identified over 20 low-inference teacher behaviors related to student evaluation of instruction. Thus, a growing body of research has established links between student achievement and student perception and between low-inference teacher clarity variables and student perception.

The present study investigates the combined effects of teacher "bluffing" and recovery, uncertainty, lesson discontinuity, and use of lecture notes handouts on student achievement and student perception.

METHOD

Subjects

Subjects were 448 students enrolled in high school history, government, or social studies classes in Richmond County, Columbia County, and McDuffie County (Georgia) public schools. Eight high schools participated in the

experiment. The students participated by virtue of their teachers' willingness to release them from regularly scheduled class time for 1 hour on each of two days. Each student was assigned to one of 16 groups (n = 28 each), which were defined by the possible combinations of two "bluffing" and recovery conditions (bluffing, no bluffing), two uncertainty conditions (uncertainty, no uncertainty), two discontinuity conditions (discontinuity, no discontinuity), and two notes handouts conditions (notes, no notes).

Procedure

Since students were drawn from eight high schools, it was not feasible to randomly assign students to the 16 groups. In an attempt to equate the groups in terms of ability, a 10 minute tape recorded lesson on the Baltic States, based on an article by Atwood (3) in the Atlantic Monthly, was presented to all 448 students in their regularly scheduled history, government, or social studies classrooms. After the lesson, the students were administered a 16-item test on the historical, geographic, and demographic characteristics of the Baltic States. This test had a reliability of .80, based on the Kuder-Richardson formula 20. The Baltic States test scores were used as baseline data to equate students in terms of ability to comprehend social studies material presented in tape recorded lessons.

Five to eight days after the Baltic States presentation, each of the 16 groups was presented a 12 minute tape recorded lesson based on an article by Dippel (7) in the Atlantic Monthly, which focused on the history, geography, and economy of Botswana. A transparency of a map of

South Africa that included Botswana's location was shown during the lesson presentations. To effect maximum control over teacher behavior variables, the 16 lessons were scripted and were presented by the same instructor. The lessons were constructed so that such factors as rate of speech, tone of voice, and variance of voice pitch were virtually the same for all 16 presentations. The only difference in the 16 lessons was the presence or absence of bluffing phrases, uncertainty phrases, instances of discontinuity, and lecture notes handouts.

The recorded lessons were essential to ensure desired levels of bluffing, uncertainty, and discontinuity. "Live" lessons are more natural and allow more generalizability for research findings, but they do not allow classroom variables to be well controlled. The recorded lessons were constructed to represent natural instruction and it is reasonable to assume that the results of this study can be generalized to secondary school social studies classrooms.

Student comprehension of the lessons on Botswana was determined by administering a 20-item test immediately after each lesson was completed. Students were not allowed to use notes handouts or personal notes during the test. The Kuder-Richardson 20 test reliability was .76. The Botswana test scores then were adjusted by using the Baltic States test scores as a covariate. The covariance-adjusted Botswana test scores were used as one criterion of lesson effectiveness.

Immediately after the students completed the test on Botswana, they were adminsitered an 11-item lesson evaluation (Table 1), which was used as a second criterion of lesson effectiveness. These items were reported by Smith and Land (30) to be indicators of the presence or absence of

teacher clarity, and it was hypothesized that bluffing, uncertainty, discontinuity, and use of lecture notes handouts would be reflected in student ratings for these items.

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Insert Table 1 about here
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Eight of the recorded lessons contained bluffing phrases (40 phrases) and eight of the lessons contained no bluffing phrases. Eight of the lessons contained uncertainty (40 phrases) and eight lessons contained no uncertainty phrases. Eight lessons contained 18 instances of discontinuity (nine irrelevant remarks, nine relevant remarks at inappropriate points of the lesson), and eight lessons had no discontinuity. Based on research by Smith and Land (31) and Smith (26), teachers who were observed in natural classroom settings used an average of 35 to 40 vagueness terms and eight to 10 instances of irrelevant remarks per 12 minutes of teacher talk. Therefore, the frequencies of bluffing, uncertainty, and discontinuity in the present study are assumed to be realistic representatives for social studies lesson presentations.

The following excerpt is from the lessons containing no bluffing phrases, no uncertainty phrases, and no instances of discontinuity.

"South Africans invest heavily in Botswana. They buy cattle from Botswanans in need of cash, fatten the cattle, and then sell the cattle for a profit. But most significant of all is the role the country of South Africa plays in Botswana's mineral industry. The two largest diamond mines are owned by a South African mining company. The company gets half of the money made by the Botswana mines. In addition to the diamond mines,

large copper and nickel mines in Botswana are owned by South African companies.

South African dominance also extends to tourist trade in Botswana. South Africans own the hotels, restaurants, and casinos that attract vacationers from Europe.

The government of the country of South Africa is based on the philosophy that the 19 million blacks of South Africa are to live and work separate from the five million whites of South Africa. Life in Botswana is more calm and stable than life in South Africa. However, signs of bitterness can be detected in the Botswanans. Only 6000 whites live in Botswana, but they hold 60 per cent of the important government jobs. The Botswana government is trying to reduce the number of whites employed by the government, but this will take years to accomplish."

The following excerpt is from the lessons containing bluffing phrases, but no uncertainty phrases and no instances of discontinuity. The bluffing phrases are italicized.

"South Africans invest heavily in Botswana. *Actually*, they buy cattle from Botswanans in need of cash, fatten the cattle, and then sell the cattle for a profit. But, *as you know*, most significant of all is the role the country of South Africa plays in Botswana's mineral industry. *In fact*, the two largest diamond mines are owned by a South African mining company. This company gets half of the money made by the Botswana mines. In addition to the diamond mines, large copper and nickel mines in Botswana are owned by South African companies.

Of course, South African dominance also extends to tourist trade in

Botswana. South Africans own the hotels, restaurants, casinos, and so on, that attract vacationers from Europe.

Frankly, the government of the country of South Africa is based on the philosophy that the 19 million blacks of South Africa are to live and work separate from the five million whites of South Africa. Life in Botswana is more calm and stable than life in South Africa. However, signs of bitterness can be detected in the Botswanans, you know. Only 6000 whites live in Botswana, but they hold 60 per cent of the important government jobs. The Botswana government is trying to reduce the number of whites employed by the government, but, of course, this will take years to accomplish."

The following excerpt is from the lessons containing uncertainty phrases, but no bluffing phrases, and no instances of discontinuity. The uncertainty phrases are italicized.

"South Africans invest heavily in Botswana. They *may* buy cattle from Botswanans in need of cash, fatten the cattle, and then sell the cattle for a profit. But *perhaps* most significant of all is the role the country of South Africa plays in Botswana's mineral industry. The two largest diamond mines are owned by a South African mining company. This company gets half of the money made by the Botswana mines. In addition to the *various* diamond mines, large copper and nickel mines in Botswana are owned by South African companies.

South African dominance also extends to tourist trade in Botswana. South Africans own the hotels, restaurants, and casinos that *often* attract vacationers from Europe.

The government of the country of South Africa is based on the philosophy

that the 19 million blacks of South Africa are to live and work someplace separate from the five million whites of South Africa. Life in Botswana is fairly much more calm and stable than life in South Africa. However, signs of bitterness can sort of be detected in the Botswanans. Only 6000 whites live in Botswana, but they hold 60 per cent of the important government jobs. The Botswana government is somehow trying to reduce the number of whites employed by the government, but this will take years to accomplish."

The following excerpt is from the lessons containing instances of discontinuity, but no bluffing phrases and no uncertainty phrases. In this excerpt, there is one instance that is an irrelevant remark and one instance of relevant information interjected at an inappropriate point of the lesson. Both instances are italicized.

"South Africans invest heavily in Botswana. They buy cattle from Botswanans in need of cash, fatten the cattle, and then sell the cattle for a profit. But most significant of all is the role the country of South Africa plays in Botswana's mineral industry. The two largest diamond mines are owned by a South African mining company. This company gets half of the money made by the Botswana mines. In addition to the diamond mines, large copper and nickel mines in Botswana are owned by South African companies. *Refugees from fighting in Rhodesia and Angola have come to Botswana.*

South African dominance also extends to tourist trade in Botswana. South Africans own the hotels, restaurants, and casinos that attract vacationers from Europe. *Investment firms from the rich middle east have invested heavily in resort areas of the United States.*

The government of the country of South Africa is based on the philosophy that the 19 million blacks of South Africa are to live and work separate from the five million whites of South Africa. Life in Botswana is more calm and stable than life in South Africa. However, signs of bitterness can be detected in the Botswanans. Only 6000 whites live in Botswana, but they hold 60 per cent of the important government jobs. The Botswana government is trying to reduce the number of whites employed by the government, but this will take years to accomplish."

Eight of the lessons were accompanied by lecture notes handouts and eight of the lessons did not use handouts. The lecture notes summarized the main topics presented in the lessons and the notes were organized to coincide with the sequence of material as it was covered in the lessons. All of the 20 test questions could be answered by listening to the lessons. Ten of the 20 questions could be answered by reading the notes handouts. Students in all 16 treatment groups were advised to take personal notes as they listened to the lesson.

The lessons containing a combined presence of two or three of the bluffing, uncertainty, and discontinuity behaviors were constructed by including all instances of these behaviors from the appropriate bluffing, uncertainty, or discontinuity conditions. All 16 lessons were exactly the same, except for the variations in bluffing, uncertainty, discontinuity, and use of notes.

RESULTS

A 2(uncertainty vs. no uncertainty) X 2(bluffing vs. no bluffing) X 2(discontinuity vs. no discontinuity) X 2(notes handouts vs. no notes

handouts) analysis of variance was performed on the adjusted Botswana test scores as well as on the scores for each of the 11 lesson evaluation items. The means and standard deviations for all 12 dependent variables are shown for each of the 16 experimental conditions in Table 2. Table 3 shows the F ratios for each of the 2 X 2 X 2 X 2 ANOVAs.

With adjusted Botswana test scores as the dependent variable, students in the uncertainty condition performed significantly lower ($p < .01$) than students in the certainty condition. Student scores were higher ($p < .01$) when they were given lecture notes handouts than when they were not given handouts. There were no significant main effects due to the bluffing condition or the discontinuity condition, although there was a significant interaction between the bluffing and discontinuity conditions ($p < .01$). Students in the bluffing condition scored higher if they were not in the discontinuity condition. Similarly, students in the discontinuity condition scored higher if they were not in the bluffing condition. This relationship is illustrated in Figure 1. A significant three-way interaction ($p < .05$) between the uncertainty, discontinuity, and notes condition occurred. Students in the (no uncertainty, no discontinuity, notes) condition and students in the (no uncertainty, discontinuity, no notes) condition scored high on the test and students in the (uncertainty, discontinuity, no notes) condition scored low. But students in the (uncertainty, no discontinuity, notes) condition scored higher than the mean test score for the entire sample. There were no other significant interactions with test scores as the dependent variable.

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Insert Figure 1 about here
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As shown in Table 3, with perception as the dependent variable, all lesson evaluation items except item i (speech soothing vs. speech irritating) involved at least one significant main effect or interaction. For item a (degree of precision), item b (decisiveness), and item f (degree of confidence), the no bluffing condition was rated significantly higher than the bluffing condition. For item e (degree of preparation) and item j (clarity of lesson), discontinuity resulted in lower evaluation scores. For item f (degree of confidence), the notes handouts condition produced significantly lower evaluation scores than did the no notes condition. There was no significant main effect due to the uncertainty condition for any of the 11 evaluation items.

Table 3 indicates that 21 significant interactions occurred involving student perception ratings. Item h (understandability of speech), item j (clarity of lesson), and item k (degree of clarity of explanations) resulted in interactions between the bluffing condition and the discontinuity condition. As previously noted, these conditions also interacted when achievement was the dependent variable. Graphs of the bluffing X discontinuity interactions for items h and k are remarkably similar to the graph shown in Figure 1. For item j, ratings in the (bluffing, no discontinuity) condition were highest and ratings in the (bluffing, discontinuity) condition were lowest.

The only other significant interaction that occurred when achievement was the dependent variable was between the uncertainty, discontinuity, and notes conditions. Item b (decisiveness) was the only perception item that produced an interaction between these three conditions. Students in the (no uncertainty, discontinuity, notes) condition and the (uncertainty,

no discontinuity, notes) condition rated the lesson highest, whereas the (uncertainty, no discontinuity, no notes) condition and the (uncertainty, discontinuity, notes) condition were rated the lowest.

Table 3 also shows that, although uncertainty negatively affected achievement, none of the 11 lesson evaluation items involved a main effect due to uncertainty. Similarly, notes handouts positively affected achievement, but there was no main effect due to the notes condition for 10 of the 11 lesson evaluation items. On item f(degree of confidence), students rated the lesson as showing less teacher confidence when notes handouts were used.

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DISCUSSION

Cautions should be observed when interpreting these results. First, the lessons were 12 minutes long and may not be representative of longer lessons. The information was presented rapidly with no time allowed for reflection or for class discussions. Second, the Botswana test was administered immediately after the lesson. No time for study or for questions was permitted. It may be that opportunity to study may partially negate the effects of the behaviors represented in this study. Third, random assignment to groups was not feasible, so a pretest was used as a covariate to adjust the Botswana test scores. It should be noted that the raw scores for the Botswana test were very similar to the adjusted test scores and that an analysis of variance performed on the raw scores produced almost identical F ratios. However, randomization is preferable

whenever possible and lends credibility to research results. A final caution is that, although 31 F ratios indicated significance beyond the .05 level, values of omega squared indicated that no more than 3 per cent of the variance in achievement or student perception can be attributed to any single main effect or interaction. That is, although 31 experimental effects were found to be significant, values of omega squared indicate that these effects are relatively weak.

With these cautions in mind, the following conclusions are made. This research indicates a cause-and-effect relationship between teacher uncertainty and student achievement. Uncertainty phrases negatively affected student achievement. Surprisingly, uncertainty had no significant effect on any of the lesson evaluation items. A cause-and-effect relation also was shown between notes handouts and achievement. The results of prior studies (e.g., 1, 6) are supported in that notes handouts had a positive effect on achievement. However, use of notes handouts caused students to perceive the instructor as being less confident. Although the bluffing condition and the discontinuity condition did not significantly affect achievement, use of bluffing phrases and instances of discontinuity significantly lowered student ratings on certain lesson evaluation items.

For achievement and the 11 evaluation items as dependent variables a total of 180 main effects and interactions were examined for significance at or beyond the .05 level. Purely by chance, approximately nine of these tests should indicate significance. But 31 of the 180 tests

revealed significant main effects or interactions, thus supporting the contention that low-inference teacher behaviors merit further study.

Further research on the differential effects of categories of vagueness terms on student achievement and perception is warranted. The results of this study indicate that different categories of vagueness affect achievement and perception in different ways. The threshold levels at which vagueness categories inhibit learning have not been determined. Preliminary research (e.g., 10, 29) provides clues to such threshold levels, but such research studied vagueness terms as a single variable rather than as distinct categories.

Teacher trainers should exercise caution in attempting to have trainees avoid excess frequencies of vagueness phrases. Vagueness terms should not be avoided at the expense of distorting the truth. For example, if a rule "generally" or "sometimes" applies, a teacher should not simply state that the rule applies, thus leaving the impression that the rule has no exceptions. Instead, the teacher could state the rule, show instances of the rule, and then state exceptions to the rule.

A final observation is that this study did not show a direct link between achievement and student perception. For example, uncertainty and notes handouts significantly affected achievement, yet these results were not reflected in the student evaluations of the lesson. Similarly, bluffing and discontinuity did not affect achievement significantly, but student ratings were lower for these conditions. Therefore, although student outcomes in terms of achievement and perception should be used as criteria of teacher effectiveness, care should be exercised in relating perception to achievement.

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Table 1. - Lesson Evaluation Form

What did you think of the teaching?						
a. precise	5	4	3	2	1	imprecise
b. decisive	5	4	3	2	1	indecisive
c. explains fully	5	4	3	2	1	does not explain fully
d. coherent	5	4	3	2	1	incoherent
e. well prepared	5	4	3	2	1	not well prepared
f. confident	5	4	3	2	1	not confident
g. well organized	5	4	3	2	1	not well organized
h. speech easy to understand	5	4	3	2	1	speech not easy to understand
i. speech soothing	5	4	3	2	1	speech irritating
j. very clear lesson	5	4	3	2	1	lesson not clear at all
k. clear and understandable explanations	5	4	3	2	1	confusing explanations

Table 2. - Group Means and Standard Deviations

Uncertainty		No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	
Bluffing		No	No	No	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	
Discontinuity		No	No	Yes	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	No	Yes	Yes	
Notes Handouts		No	Yes	No	No	No	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Totals
Achievement Scores		9.90 (3.20)	10.31 (2.57)	10.32 (2.63)	10.34 (2.85)	8.33 (2.01)	11.36 (2.81)	8.76 (3.25)	11.39 (3.49)	9.82 (3.47)	9.60 (2.99)	8.59 (3.56)	10.88 (2.78)	10.87 (2.70)	11.33 (3.22)	9.60 (2.81)	8.67 (1.80)	10.00 (3.04)
Response Item	a.	3.21 (1.03)	3.61 (0.96)	3.68 (0.86)	3.50 (0.88)	3.21 (0.92)	3.21 (0.96)	2.82 (0.90)	3.14 (1.33)	3.68 (0.94)	3.46 (1.48)	3.36 (1.03)	3.46 (1.23)	3.54 (1.10)	3.36 (1.06)	3.29 (1.15)	2.64 (1.10)	3.32 (1.09)
	b.	3.39 (0.99)	3.50 (0.79)	3.57 (0.74)	3.36 (0.73)	3.32 (1.28)	3.43 (1.14)	2.71 (0.81)	3.07 (1.12)	3.75 (0.97)	3.14 (1.11)	3.00 (0.98)	3.54 (1.10)	3.43 (1.14)	3.39 (1.07)	3.32 (1.09)	2.89 (1.03)	3.30 (1.07)
	c.	3.64 (1.22)	4.00 (1.12)	3.71 (0.94)	3.50 (1.07)	3.29 (1.08)	3.50 (1.23)	3.29 (1.08)	3.29 (1.33)	3.57 (1.26)	3.54 (1.35)	3.36 (1.03)	3.68 (1.22)	3.46 (1.23)	3.82 (1.02)	3.54 (1.20)	2.96 (0.88)	3.51 (1.15)
	d.	3.04 (1.07)	3.25 (0.89)	3.57 (0.92)	3.04 (0.69)	3.25 (1.00)	3.11 (1.10)	3.11 (0.69)	3.07 (1.12)	3.39 (1.07)	3.14 (1.27)	3.57 (0.88)	3.39 (1.03)	3.21 (1.10)	3.43 (1.03)	3.25 (1.11)	2.86 (1.30)	3.23 (1.03)
	e.	3.96 (1.14)	4.04 (0.92)	3.86 (0.71)	3.57 (0.92)	3.61 (1.20)	3.46 (1.10)	3.46 (1.10)	3.36 (1.37)	3.79 (1.23)	3.54 (1.45)	3.86 (0.93)	3.71 (1.08)	3.82 (1.19)	4.00 (0.94)	3.68 (0.94)	2.93 (1.18)	3.67 (1.12)
	f.	3.78 (1.29)	3.50 (1.20)	3.93 (1.02)	3.36 (1.13)	3.75 (1.11)	3.46 (1.35)	3.25 (0.80)	3.36 (1.03)	3.39 (1.10)	3.54 (0.92)	3.36 (1.06)	3.64 (1.06)	3.50 (1.11)	3.36 (1.06)	3.64 (1.25)	2.57 (1.23)	3.46 (1.13)
	g.	3.57 (1.14)	3.86 (0.89)	3.82 (0.90)	3.61 (1.17)	3.36 (1.19)	3.54 (1.17)	2.93 (1.15)	3.46 (1.32)	3.82 (1.19)	3.82 (1.31)	3.64 (0.83)	4.14 (1.24)	3.86 (1.08)	3.54 (1.10)	3.61 (1.17)	3.18 (1.02)	3.61 (1.14)
	h.	3.25 (1.17)	3.64 (1.06)	4.00 (1.05)	3.54 (1.23)	3.21 (1.29)	3.29 (1.21)	3.54 (1.17)	3.54 (1.57)	3.29 (1.05)	3.82 (1.25)	3.64 (1.10)	3.32 (1.44)	3.50 (1.23)	3.57 (1.00)	3.61 (1.17)	2.86 (1.43)	3.48 (1.23)
	i.	2.86 (1.21)	3.25 (1.29)	3.29 (1.01)	3.07 (1.02)	2.86 (1.30)	3.07 (1.30)	2.89 (1.26)	2.89 (1.59)	3.14 (1.18)	3.00 (1.52)	3.11 (1.23)	3.25 (1.32)	3.11 (1.23)	2.79 (1.26)	2.75 (1.38)	2.46 (1.37)	2.99 (1.28)
	j.	2.89 (1.29)	3.75 (1.14)	3.61 (0.83)	3.46 (1.26)	3.14 (1.18)	3.00 (1.05)	2.89 (1.10)	3.54 (1.26)	3.36 (1.03)	2.89 (1.47)	3.39 (0.96)	3.00 (1.25)	3.43 (1.29)	3.68 (1.12)	3.32 (1.12)	2.82 (1.16)	3.26 (1.19)
	k.	2.75 (1.11)	3.54 (1.17)	3.43 (0.79)	3.29 (0.90)	3.25 (0.70)	3.18 (1.09)	2.96 (0.92)	3.29 (1.41)	3.32 (1.19)	3.57 (1.45)	3.46 (0.88)	3.50 (1.35)	3.46 (1.14)	3.57 (0.96)	3.39 (1.17)	2.57 (1.26)	3.28 (1.13)

Note: Figures in parentheses are the standard deviations.

Table 3. - F Ratios of ANOVAs

Variable	Uncertainty (A)	Bluffing (B)	Discontinuity (C)	Notes (D)	AB	AC	AD	BC	BD	CD	ABC	ABD	ACD	BCD	ABCD
Achievement Scores	8.46**	< 1	< 1	17.24**	< 1	< 1	< 1	11.69**	< 1	1.00	< 1	1.45	6.33*	1.88	3.07
Response Item a.	< 1	6.30*	1.42	< 1	< 1	< 1	< 1	2.66	1.03	1.21	< 1	3.59	2.12	3.93*	6.76**
b.	< 1	8.52**	< 1	2.34	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.93	5.58*	< 1	6.99**
c.	1.52	2.19	< 1	< 1	1.15	< 1	< 1	< 1	< 1	2.44	2.70	< 1	2.70	< 1	4.59*
d.	< 1	< 1	< 1	< 1	< 1	6.38*	< 1	< 1	< 1	< 1	< 1	2.88	< 1	< 1	2.04
e.	< 1	3.23	4.22*	< 1	1.24	1.05	< 1	< 1	< 1	< 1	6.59**	2.92	< 1	< 1	5.34*
f.	1.96	7.60**	< 1	4.68*	< 1	1.13	1.73	< 1	< 1	< 1	< 1	4.69*	1.31	< 1	5.41*
g.	< 1	3.25	< 1	1.48	< 1	< 1	1.69	< 1	< 1	< 1	1.35	6.12*	3.25	5.71*	4.50*
h.	< 1	< 1	< 1	3.01	< 1	< 1	< 1	5.54*	< 1	6.68*	1.09	< 1	< 1	< 1	1.61
i.	1.94	1.94	< 1	< 1	< 1	1.05	< 1	< 1	1.05	< 1	< 1	1.05	< 1	1.94	< 1
j.	< 1	< 1	6.51*	1.19	< 1	< 1	< 1	4.26*	1.38	4.61*	< 1	1.04	1.20	< 1	8.72**
k.	< 1	< 1	< 1	< 1	< 1	1.02	4.68*	5.44*	< 1	3.65	1.66	< 1	< 1	< 1	7.67**

*p < .05
**p < .01

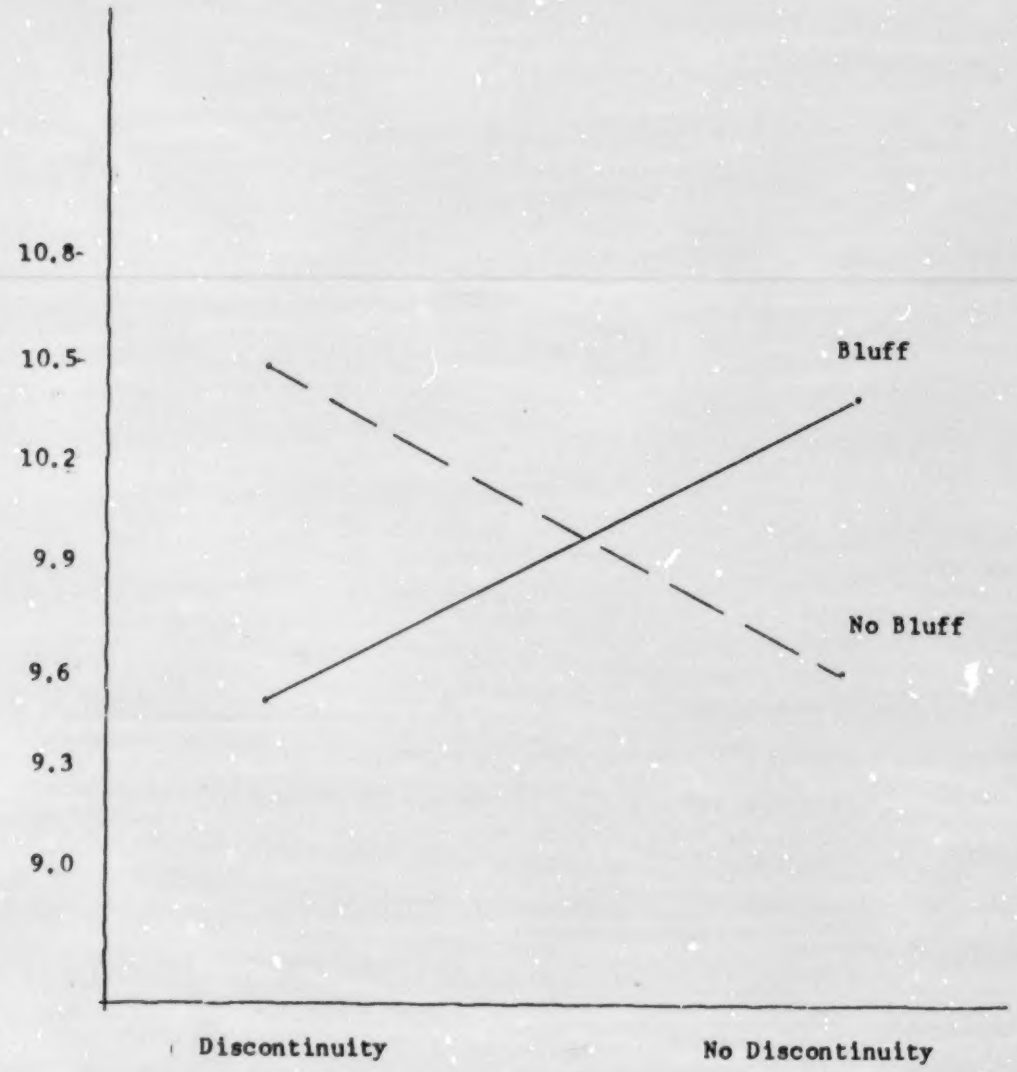

Figure 1. Interaction between bluffing and discontinuity for mean adjusted test scores.